NOTES, ABSTRACTS AND REVIEWS.

NEW DETERMINATIONS OF THE PRECIPITATION OVER THE OCEANS.

By J. VON HANN.

[Abstracted from *Petermann's Mitteilungen*, June, 1920, pp. 126-128.]

While fairly reliable determinations of total precipitation over land areas can be made, such determinations for the oceans must depend upon less direct observations. The means usually employed to arrive at this quantity consist in attributing the difference between the estimated evaporation and the estimated inflow from rivers to precipitation. This assumes, of course, that sea-level remains constant. But different investigators have arrived at widely different results. For example, Brückner, Schmidt, and Lütgens have obtained 1,052 mm., 755.6 mm., and 1,410 mm., respectively, for the value of the annual precipitation.

The wide divergence of these values has led von Kerner to make a new investigation based on the new rainfall maps of the Atlantic and Indian Oceans by Supan, and, while he has reason to believe that his value is somewhat too high, it is in very good accord with that of Brückner, namely, 1,000 mm. A short table of his values for various latitudes is given:

Latitude (°, N. and S.)	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Precipitation (mm.)	1,625	875	525	1,000	1,375	1,050	550

For the whole earth, the ratio of ocean precipitation to land precipitation reaches a maximum in middle latitudes.—*C. L. M.*

ICE IN THE ARCTIC SEAS DURING 1920.

[Reprinted from *Nature*, London, Apr. 14, 1921, p. 216.]

The Danish Meteorological Institute has published the issue for 1920 of the annual report on the state of the ice in the Arctic seas. The year showed several peculiarities in amount and distribution, although information was lacking from many regions. In the Barents Sea ice was much scarcer than usual, and there was open water as far east as Novaya Zemlya all the summer, while even the Kara Sea offered fewer difficulties than in normal years. On the west coast of Spitzbergen [1] the condition differed little from the normal, but Storfjord was exceptionally free from ice in late summer. There is little information from the east coast of Greenland, but more ice than usual passed around Cape Farewell into Davis Strait. This meant that the ice must have been packed close against the east coast, since the shores of Iceland were practically free from ice throughout the year.

On the Newfoundland Banks icebergs were numerous, and drifted somewhat further south than usual during the first half of the year. In Davis Strait and Melville Bay the ice was more abundant than usual during the spring and early summer.

[1] See "Mild Winter of 1920-21 in Northern Europe," Mo. WEATHER REV., Feb., 1921, 49:89.

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PRACTICAL APPLICATION OF THE ELECTRICAL-CONDUCTIVITY METHOD OF MEASURING SEA-WATER SALINITY.

By A. L. THURAS.

[Reprinted from *Jour. Wash. Acad. Sciences*, vol. 11, no. 7, pp. 160-161.]

Heretofore the only reliable method of measuring the total salt content of sea water has been by chemically titrating for the amount of chlorine present. The relation of chlorine to the total salts being a constant, a measure of the salinity is thereby obtained. Salinity is defined as the number of grams of total salts in 1,000 grams of sea water. The titration method, being a laboratory method, requires that the samples after collection be stored in suitable bottles until they can be tested on shore. The disadvantages of such a method are the loss or breakage of samples, possible errors from evaporation and handling, and the great undesirability of not knowing the physical properties of the waters while they are being investigated.

During the Ice Patrol of 1920 an opportunity was given to use the electrical method of measuring sea-water salinity on board ship. An apparatus consisting of instruments and parts secured from the Bureau of Standards was set up on shipboard and several hundred determinations of salinity were made. The operation of the apparatus was simple and convenient, and at no time did weather conditions interfere with the measurements. This apparatus consisted of a Wheatstone bridge, a Leeds and Northrup alternating-current galvanometer, a specially constructed electrolytic cell designed for a salinity recorder,[1] a hand-regulated temperature bath, and a rebuilt one-twelfth horsepower direct-current motor to give 120 volts, 60 cycles of alternating current when connected to 110 volts direct current. This machine was designed and built by Mr. A. J. Fecht, of the Bureau of Standards.

All measurements were made at 25° C., and a table was prepared to give salinities directly from the balanced bridge readings. The complete apparatus was tested each day by standard sea water taken from a supply which had been carefully measured both by a chemical method and a density method [2] before beginning the cruises. This supply of sea water lasted throughout the cruises. The temperature of the electrolytic cell bath could easily be held to within 0.03° C., and the bridge, after balancing the moving coil of the galvanometer so that the center of mass was fairly near the axis of support, could be set to a value corresponding to 0.02 in salinity. No electrical capacity or inductance was necessary for balancing the bridge, and variations in the voltage and frequency of the generator had no appreciable effect on the bridge setting. With the rough apparatus used the determinations were accurate to 0.05 in salinity, or better than 0.02 of 1 per cent.

Since the electrical conductivity method may be satisfactorily used at sea to measure the salt content of ocean

[1] See *Jour. Wash. Acad. Sciences*, 1918, vol. 8, pp. 145, 680; also "An Electrical Instrument for Recording Sea-Water Salinity," by E. E. Weibel and A. L. Thuras in Mo. WEATHER REV., Feb., 1919, 47:105-106.

[2] See *Jour. Wash. Acad. Sciences*, Washington, 1917, vol. 7: 605.

water, attention is directed to the references given in the footnotes which describe an apparatus which will give a continuous record of sea-water salinity from a moving vessel. This instrument in conjunction with an instrument to record temperature, which has been constructed, would give the three most important physical variables of sea water, namely, temperature, salinity, and density. Such records taken regularly over the same course would show monthly and yearly variations of these physical properties which might be of much scientific value.

ETHER DIFFERENTIAL RADIOMETER.[1]

By W. H. DINES.

[Reprinted from *Science Abstracts*, 1921, 24: 216.]

The instrument consists essentially of a sensitive differential thermometer formed by two test tubes, each containing a few drops of ether, mounted with their axes in a horizontal line and communicating with each other by a U-tube containing ether to form a pressure gage. A metal shield is placed around each tube, with a horizontal slit to admit radiation. The direction from which radiation is admitted to either tube can be controlled by rotating the appropriate shield about the common axis.

Method of use.—There are two ways of using the instrument. In the direct method radiation from a portion of the sky is allowed to fall on one tube while the other is exposed to a full radiator, a vessel containing water, the temperature of which is altered until a balance is obtained. The equivalent radiative temperature of the sky (i. e., the downward radiation from the atmosphere) is then equal to the temperature of the full radiator. In the indirect method, instead of altering the temperature of the full radiator, the tube exposed to the sky is allowed to receive radiation from a second full radiator, of constant temperature, so placed as to effect a balance. A simple calculation then gives the equivalent radiative temperature of the sky.—*M. A. G.*

551.508.5 (048)

SIMPLE MAXIMUM ANEMOMETER.[1]

By P. L MERCANTON.

(Reprinted from *Science Abstracts*, 1921, 24: § 339.)

It is often desirable to have instrumental evidence as to the maximum force attained by the wind during a gale, and for this purpose a simple, inexpensive maximum anemometer would be useful. The principle of the Pitot tube suggests itself. Three forms of the instrument have been designed. The first two necessitate the employment of a Dines vane communicating with a manometer. In the first this consists of a U-tube containing oil. The difference between the static and dynamic pressure of the air displaces the oil in the tube, and the farthest point reached is marked by a glass index acting like that in a minimum thermometer. In the second form a metallic Bourdon-Richard manometer is used, recording by a light pivoted index. The third instrument is cheaper, but less accurate. It consists of a glass reservior with two tubes leading out of it, one vertically and the other obliquely, and at the top each tube has a shore horizontal extension, in the plane of the two tubes. Tht whole is mounted on a vertical pivot and swings with the wind, so that the horizontal extension from the vertical tube faces the wind. The reservoir contains oil, which also enters the lower part of the oblique tube. During wind the oil is consequently forced up the latter, which has at intervals small pockets. These retain small drops of oil when the main body recedes, and the highest pocket so filled marks the approximate height to which the oil ascended, and hence gives an approximate measure of the force attained by the wind. [The diagram illustrating the instrument appears to be printed upside down.]—*M. A. G.*

[1] Jour. Roy. Metl. Soc., London, Oct., 1920, 46:399–405; discussion, 405–406.
[1] *Archives des Sciences*, 2: 511–513. Nov.-Dec., 1920.

AMERICAN METEOROLOGICAL SOCIETY MEETING IN WASHINGTON, APRIL 20–21, 1921.

The fifth meeting of the American Meteorological Society was held, amid flag-bedecked surroundings, at the central office of the Weather Bureau on the evening of the 20th and morning of the 21st. There were 21 papers on the program, 3 of which were read by title. One of these papers was published in the March REVIEW, one and abstracts of two others are in this REVIEW, and it is expected that the others will appear in full or in abstract in early numbers of the REVIEW.

Various phases of areological work, particularly (1) making of wind-aloft observations, with free balloons, with kites, and clouds; (2) studying the data; and (3) distributing current aerological information and forecasts for aviators by radio. Some aspects agricultural meteorology, mathematics in meteorology, new instruments, and measurements of sky brightness were presented. Those present were particularly fortunate in hearing Dr. John Paraskévopoulos, of Athens, Greece, tell about the meteorological service in Greece. He was spending two months at the central office studying methods and equipment of the Weather Bureau.

A more complete account of the meeting will found in the May or June, 1921, Bulletin of the American Meteorological Society.—*C. F. B.*

551.509.6 (048)

THE ARTIFICIAL CONTROL OF WEATHER.

By Sir NAPIER SHAW.

[Abstract reprinted from the *Meteorological Magazine*, April, 1921, pp. 60-63; with excerpts inserted from *Aeronautics*, Apr. 7 and 14, 1921. Reprinted also in *Aerial Age Weekly*, May 9, 1921, pp. 203-205.]

On March 9th Sir Napier Shaw delivered a lecture on the artificial control of weather before the Cambridge University Aeronautical Society. A résumé of the lecture is given below.

"The control of weather has been a subject of vivid interest from the dawn of history down to the present day. It is woven into the fabric of every form of civilization. The claims of the rain-maker are in some cases modern; but they are not exclusively modern, and are not to be regarded as one of the many signs of the progress of physical science in civilized nations. * * * Quite deep down in human nature is apparently the feeling that if man can not himself control the weather, at least he knows who or what can; and he can bring influence to bear upon the spirits of the air that will guide the control in the manner desired." Few subjects of speculation are more inter-